In the Claims:

Please amend Claims 1-15 as indicated below. The status of all claims is as follows:

1. (Currently Amended) A position detecting method for a head being transferred to a radial direction of a medium and recording and reproducing information, ~~characterized by~~ comprising:

~~the step~~ a step of recording a position information signal pattern into the medium, the position information signal pattern being configured by arranging graphics surrounded by a certain closed curve as pattern elements uniformly on a plane, arranging the pattern elements in circumferential and radial directions of a disc so that a phase and a head position establish a proportional relationship in two or more frequency components of a reproduced signal; and

~~the step~~ a step of ~~demodulating~~ determining a position signal of the head by phase-modulating two or more different frequencies from the reproduced signal of the position information signal ~~pattern.~~ pattern, and determining a position signal of the head by adding the position signal resulting from the demodulation at a certain ratio.

2. (Currently Amended) The position detecting method according to claim 1, ~~characterized in that~~ wherein the position information signal pattern is recorded in a manner that

the graphics surrounded by the certain closed curve are used as the pattern elements,

the pattern elements are arranged on the plane with constant intervals in an x axial direction,

one arbitrary vector which is not parallel with the x axial direction is determined, and the pattern elements are further arranged on a position which is transferred in parallel by integral multiple of the vector with respect to all the pattern elements arranged on the x axis so as to be arranged uniformly on a recording plane,

the plane where the pattern elements are arranged is rotated through an arbitrary angle,

a portion for an arbitrary width determined with respect to the x axial direction is fetched from the plane where the pattern elements are arranged, so as to be a first burst area,

the first burst area is inverted axisymmetrically with respect to the x axis so as to be a second burst area,

the first and second burst areas are arranged so that their x axes match with the circumferential direction of the disc, and their y axes match with the radial direction of the disc.

3. (Currently Amended) The position detecting method according to claim 1, ~~characterized in that~~ wherein the position information signal pattern is recorded in a manner that,

the graphics surrounded by the certain curve surface are used as the pattern elements,

the pattern elements are arranged on the plane with constant intervals in an x axial direction,

one arbitrary vector which is not parallel with the x axial direction is determined, and the pattern elements are further arranged on a position which is transferred in parallel by integral multiple of the vector with respect to all the pattern elements arranged on the x axis so as to be arranged uniformly on a recording plane,

when a size of the vector "a" is designated by "a", an angle formed by the vector "a" and the x axis is designated by θ, and an interval of the pattern elements in the x axial direction is designated by b, one of combinations of arbitrary integral numbers (k, l, m, n) which satisfies:

$$km \cdot a^2+(kn+lm) \cdot ab \cdot \cos\theta+ln \cdot b^2 = 0$$

is determined, and α and β are obtained as follows:

$$\alpha = ka \cdot \cos\theta + lb$$

$$\beta = \sqrt{\{(ka)^2 + 2klab \cdot \cos\theta + (lb)^2\}},$$

when an y axial component of the vector (ka) is positive,

$$\varphi = \text{Arccos}\ (\alpha/\beta),$$

when the y axial component of the vector (ka) is negative,

$$\varphi = -\text{Arccos}\ (\alpha/\beta),$$

and the plane where the pattern elements are arranged is rotated through the angle $-\varphi$ in a state that a counterclockwise direction is the positive direction,

a portion for an arbitrary width determined with respect to the x axial direction is fetched from the plane where the pattern elements are arranged, so as to be a first burst area,

the first burst area is inverted axisymmetrically with respect to the x axis so as to be a second burst area,

the first and second burst areas are arranged so that their x axes match with the circumferential direction of the disc and their y axes match with the radial direction of the disc, and thus periodicity is provided to the circumferential and radial directions simultaneously.

4. (Currently Amended) The position detecting method according to claim 1, ~~characterized in that~~ wherein the position information signal pattern is recorded in a manner that,

the graphics surrounded by the certain closed curve are used as the pattern elements,

the pattern elements are arranged on the plane with constant intervals in an x axial direction,

one arbitrary vector which is not parallel with the x axial direction is determined, and the pattern elements are further arranged on a position which is transferred in parallel by integral multiple of the vector with respect to all the pattern elements arranged on the x axis so as to be arranged uniformly on a recording plane,

when a size of the vector "a" is designated by "a", an angle formed by the vector "a" and the x axis is designated by θ, and an interval of the pattern elements in the x axial direction is designated by b, one of combinations of arbitrary integral numbers (k, l) is determined, and α and β are obtained as follows:

$$\alpha = ka \cdot \cos\theta + lb$$

$$\beta = \sqrt{\{(ka)^2 + 2klab \cdot \cos\theta + (lb)^2\}},$$

when an y axial component of the vector (ka) is positive,

$$\varphi = \text{Arccos}\ (\alpha/\beta),$$

when the y axial component of the vector (ka) is negative,

$$\varphi = -\text{Arccos}\ (\alpha/\beta),$$

and the plane where the pattern elements are arranged is rotated through the angle $-\varphi$ in a state that a counterclockwise direction is the positive direction,

a portion for an arbitrary width determined with respect to the x axial direction

is fetched from the plane where the pattern elements are arranged, so as to be a first burst area,

the first burst area is inverted axisymmetrically with respect to the x axis so as to be a second burst area,

the first and second burst areas are arranged so that their x axes match with the circumferential direction of the disc and their y axes match with the radial direction of the disc, and thus periodicity is provided to the circumferential direction.

5. (Currently Amended) The position detecting method according to claim 1, ~~characterized in that~~ wherein the position information signal pattern is recorded in a manner that,

the graphics surrounded by the certain closed curve are used as the pattern elements,

the pattern elements are arranged on the plane with constant intervals in an x axial direction,

one arbitrary vector which is not parallel with the x axial direction is determined, and the pattern elements are further arranged on a position which is transferred in parallel by integral multiple of the vector with respect to all the pattern elements arranged on the x axis so as to be arranged uniformly on a recording plane,

when a size of the vector "a" is designated by a, an angle formed by the vector "a" and the x axis is designated by θ, and an interval of the pattern elements in the x axial

direction is designated by b, one of combinations of arbitrary integral numbers (m, n) is determined, and α and β are obtained as follows:

$$\alpha = ma \cdot \cos\theta + nb$$

$$\beta = \sqrt{\{(ma)^2 + 2mnab \cdot \cos\theta + (nb)^2\}},$$

when an y axial component of the vector (ma) is positive,

$$\varphi = \text{Arccos}\,(\alpha/\beta) - 90°,$$

when the y axial component of the vector (ma) is negative,

$$\varphi = 90° - \text{Arccos}\,(\alpha/\beta),$$

and the plane where the pattern elements are arranged is rotated through the angle $-\varphi$ in a state that a counterclockwise direction is the positive direction,

a portion for an arbitrary width determined with respect to the x axial direction is fetched from the plane where the pattern elements are arranged, so as to be a first burst area,

the first burst area is inverted axisymmetrically with respect to the x axis so as to be a second burst area,

the first and second burst areas are arranged so that their x axes match with the circumferential direction of the disc and their y axes match with the radial direction of the disc, and thus periodicity is provided to the radial direction.

6. (Currently Amended) An information recording/reproducing device for transferring a head to a radial direction so as to record and reproduce information,

~~characterized by~~ comprising:

a position information signal pattern recorded into a medium, the position information signal pattern configured by arranging graphics surrounded by a certain closed curve as pattern elements uniformly on a plane and arranging the pattern elements in circumferential and radial directions of a disc so that a phase and a head position establish a proportional relationship in two or more frequency components of a reproduced signal; and

a position signal demodulating unit for demodulating a position signal of the head by phase-demodulating two or more different frequencies from the position information signal ~~pattern.~~ pattern and for determining a position signal of the head by adding the position signal resulting from the demodulation at a certain ratio.

7. (Currently Amended) The information recording/reproducing device according to claim 6, ~~characterized in that~~ wherein the position information signal pattern is recorded in a manner that,

the graphics surrounded by the certain closed curve are used as the pattern elements,

the pattern elements are arranged on the plane with constant intervals in an x axial direction,

one arbitrary vector which is not parallel with the x axial direction is determined, and the pattern elements are further arranged on a position which is transferred in parallel by integral multiple of the vector with respect to all the pattern elements arranged

on the x axis so as to be arranged uniformly on a recording plane,

when a size of the vector "a" is designated by "a", an angle formed by the vector "a" and the x axis is designated by θ, and an interval of the pattern elements in the x axial direction is designated by b, one of combinations of arbitrary integral numbers (k, l, m, n) which satisfies:

$$km \cdot a^2+(kn+lm) \cdot ab \cdot \cos\theta+ln \cdot b^2 = 0$$

is determined, and α and β are obtained as follows:

$$\alpha = ka \cdot \cos\theta+lb$$

$$\beta = \sqrt{\{(ka)^2+2klab \cdot \cos\theta + (lb)^2\}},$$

when an y axial component of the vector (ka) is positive,

$$\varphi = \text{Arccos}\ (\alpha/\beta),$$

when the y axial component of the vector (ka) is negative,

$$\varphi = -\text{Arccos}\ (\alpha/\beta),$$

and the plane where the pattern elements are arranged is rotated through the angle $-\varphi$ in a state that a counterclockwise direction is the positive direction,

a portion for an arbitrary width determined with respect to the x axial direction is fetched from the plane where the pattern elements are arranged, so as to be a first burst area,

the first burst area is inverted axisymmetrically with respect to the x axis so as to be a second burst area,

the first and second burst areas are arranged so that their x axes match with the

circumferential direction of the disc and their y axes match with the radial direction of the disc, and thus periodicity is provided to the circumferential and radial directions simultaneously.

8. (Currently Amended) The information recording/reproducing device according to claim 6, ~~characterized in that~~ wherein the position information signal pattern is recorded in a manner that,

the graphics ~~surrounded~~ surrounded by the certain closed curve are used as the pattern elements,

the pattern elements are arranged on the plane with constant intervals in an x axial direction,

one arbitrary vector which is not parallel with the x axial direction is determined, and the pattern elements are further arranged on a position which is transferred in parallel by integral multiple of the vector with respect to all the pattern elements arranged on the x axis so as to be arranged uniformly on a recording plane,

the plane where the pattern elements are arranged is rotated through an arbitrary angle,

a portion for an arbitrary width determined with respect to the x axial direction is fetched from the plane where the pattern elements are arranged, so as to be a first burst area,

the first burst area is inverted axisymmetrically with respect to the x axis so as to be a second burst area,

the first and second burst areas are arranged so that their x axes match with the circumferential direction of the disc, and their y axes match with the radial direction of the disc.

9. (Currently Amended) The information recording/reproducing device according to claim 6, ~~characterized in that~~ wherein the position information signal pattern is recorded in a manner that,

the graphics surrounded by the certain closed curve are used as the pattern elements,

the pattern elements are arranged on the plane with constant intervals in an x axial direction,

one arbitrary vector which is not parallel with the x axial direction is determined, and the pattern elements are further arranged on a position which is transferred in parallel by integral multiple of the vector with respect to all the pattern elements arranged on the x axis so as to be arranged uniformly on a recording plane,

when a size of the vector "a" is designated by "a", an angle formed by the vector "a" and the x axis is designated by θ, and an interval of the pattern elements in the x axial direction is designated by b, one of combinations of arbitrary integral numbers (k, l) is determined, and α and β are obtained as follows:

$$\alpha = ka \cdot \cos\theta + lb$$

$$\beta = \sqrt{\{(ka)^2 + 2klab \cdot \cos\theta + (lb)^2\}},$$

when an y axial component of the vector (ka) is positive,

$$\varphi = \text{Arccos}\ (\alpha/\beta),$$

when the y axial component of the vector (ka) is negative,

$$\varphi = -\text{Arccos}\ (\alpha/\beta),$$

and the plane where the pattern elements are arranged is rotated through the angle $-\varphi$ in a state that a counterclockwise direction is the positive direction,

a portion for an arbitrary width determined with respect to the x axial direction is fetched from the plane where the pattern elements are arranged, so as to be a first burst area,

the first burst area is inverted axisymmetrically with respect to the x axis so as to be a second burst area,

the first and second burst areas are arranged so that their x axes match with the circumferential direction of the disc and their y axes match with the radial direction of the disc, and thus periodicity is provided to the circumferential direction.

10. (Currently Amended) The information recording/reproducing device according to claim 6, ~~characterized in that~~ wherein the position information signal pattern is recorded in a manner that,

the graphics surrounded by the certain closed curve are used as the pattern elements,

the pattern elements are arranged on the plane with constant intervals in an x axial direction,

one arbitrary vector which is not parallel with the x axial direction is determined, and the pattern elements are further arranged on a position which is transferred in parallel by integral multiple of the vector with respect to all the pattern elements arranged on the x axis so as to be arranged uniformly on a recording plane,

when a size of the vector "a" is designated by "a", an angle formed by the vector "a" and the x axis is designated by θ, and an interval of the pattern elements in the x axial direction is designated by b, one of combinations of arbitrary integral numbers (m, n) is determined, and α and β are obtained as follows:

$$\alpha = ma \cdot \cos\theta + nb$$

$$\beta = \sqrt{\{(ma)^2 + 2mnab \cdot \cos\theta + (nb)^2\}},$$

when an y axial component of the vector (ma) is positive,

$$\varphi = \text{Arccos}\,(\alpha/\beta) - 90°,$$

when the y axial component of the vector (ma) is negative,

$$\varphi = 90° - \text{Arccos}\,(\alpha/\beta),$$

and the plane where the pattern elements are arranged is rotated through the angle $-\varphi$ in a state that a counterclockwise direction is the positive direction,

a portion for an arbitrary width determined with respect to the x axial direction is fetched from the plane where the pattern elements are arranged, so as to be a first burst area,

the first burst area is inverted axisymmetrically with respect to the x axis so as to be a second burst area,

the first and second burst areas are arranged so that their x axes match with the circumferential direction of the disc and their y axes match with the radial direction of the disc, and thus periodicity is provided to the radial direction.

11. (Currently Amended) An information recording medium for transferring a head to a radial direction so as to record and reproduce information thereinto, ~~characterized in that~~ wherein the information recording medium records a position information signal pattern, where graphics surrounded by a certain closed curve are arranged as pattern elements uniformly on a plane and the pattern elements are arranged in circumferential and radial directions of a disc so that a phase and a head position establish a proportional relationship in two or more frequency components of a reproduced signal ~~thereinto.~~ and so that a position signal of the head can be determined by phase-demodulating two or more different frequencies from a reproduced signal of the position information signal pattern and adding the position signal resulting from the demodulation at a certain ratio.

12. (Currently Amended) The information recording medium according to claim 11, ~~characterized in that~~ wherein the position information signal pattern is recorded in a manner that

the graphics surrounded the certain closed curve are used as the pattern elements,

the pattern elements are arranged on the plane with constant intervals in an x axial direction,

one arbitrary vector which is not parallel with the x axial direction is determined, and the pattern elements are further arranged on a position which is transferred in parallel by integral multiple of the vector with respect to all the pattern elements arranged on the x axis so as to be arranged uniformly on a recording plane,

the plane where the pattern elements are arranged is rotated through an arbitrary angle,

a portion for an arbitrary width determined with respect to the x axial direction is fetched from the plane where the pattern elements are arranged, so as to be a first burst area,

the first burst area is inverted axisymmetrically with respect to the x axis so as to be a second burst area,

the first and second burst areas are arranged so that their x axes match with the circumferential direction of the disc, and their y axes match with the radial direction of the disc.

13. (Currently Amended) The information recording medium according to claim 11, ~~characterized in that~~ wherein the position information signal pattern is recorded in a manner that,

the graphics surrounded by the certain closed curve are used as the pattern elements,

the pattern elements are arranged on the plane with constant intervals in an x axial direction,

one arbitrary vector which is not parallel with the x axial direction is determined, and the pattern elements are further arranged on a position which is transferred in parallel by integral multiple of the vector with respect to all the pattern elements arranged on the x axis so as to be arranged uniformly on a recording plane,

when a size of the vector "a" is designated by "a", an angle formed by the vector "a" and the x axis is designated by θ, and an interval of the pattern elements in the x axial direction is designated by b, one of combinations of arbitrary integral numbers (m, n) is determined, and α and β are obtained as follows:

$$\alpha = ma \cdot \cos\theta + nb$$

$$\beta = \sqrt{\{(ma)^2 + 2mnab \cdot \cos\theta + (nb)^2\}},$$

when an y axial component of the vector (ma) is positive,

$$\varphi = \text{Arccos}\,(\alpha/\beta) - 90°,$$

when the y axial component of the vector (ma) is negative,

$$\varphi = 90° - \text{Arccos}\,(\alpha/\beta),$$

and the plane where the pattern elements are arranged is rotated through the angle $-\varphi$ in a state that a counterclockwise direction is the positive direction,

a portion for an arbitrary width determined with respect to the x axial direction is fetched from the plane where the pattern elements are arranged, so as to be a first burst area,

the first burst area is inverted axisymmetrically with respect to the x axis so as to be a second burst area,

the first and second burst areas are arranged so that their x axes match with the circumferential direction of the disc and their y axes match with the radial direction of the disc, and thus periodicity is provided to the radial direction.

14. (Currently Amended) The information recording medium according to claim 11, ~~characterized in that~~ wherein the position information signal pattern is recorded in a manner that,

the graphics surrounded by the certain closed curve are used as the pattern elements,

the pattern elements are arranged on the plane with constant intervals in an x axial direction,

one arbitrary vector which is not parallel with the x axial direction is determined, and the pattern elements are further arranged on a position which is transferred in parallel by integral multiple of the vector with respect to all the pattern elements arranged on the x axis so as to be arranged uniformly on a recording plane,

when a size of the vector "a" is designated by "a", an angle formed by the vector "a" and the x axis is designated by θ, and an interval of the pattern elements in the x axial direction is designated by b, one of combinations of arbitrary integral numbers (k, l, m, n) which satisfies:

$$km \cdot a^2+(kn+lm) \cdot ab \cdot \cos\theta+ln \cdot b^2 = 0$$

is determined, and α and β are obtained as follows:

$$\alpha = ka \cdot \cos\theta+lb$$

$$\beta = \sqrt{\{(ka)^2+2klab \cdot \cos\theta + (lb)^2\}},$$

when an y axial component of the vector (ka) is positive,

$$\varphi = \text{Arccos}\ (\alpha/\beta),$$

when the y axial component of the vector (ka) is negative,

$$\varphi = -\text{Arccos}\ (\alpha/\beta),$$

and the plane where the pattern elements are arranged is rotated through the angle $-\varphi$ in a state that a counterclockwise direction is the positive direction,

a portion for an arbitrary width determined with respect to the x axial direction is fetched from the plane where the pattern elements are arranged, so as to be a first burst area,

the first burst area is inverted axisymmetrically with respect to the x axis so as to be a second burst area,

the first and second burst areas are arranged so that their x axes match with the circumferential direction of the disc and their y axes match with the radial direction of the disc, and thus periodicity is provided to the circumferential and radial directions simultaneously.

15. (Currently Amended) The information recording medium according to claim 11, ~~characterized in that~~ wherein the position information signal pattern is recorded in a manner that,

the graphics surrounded by the certain closed curve are used as the pattern elements,

the pattern elements are arranged on the plane with constant intervals in an x axial direction,

one arbitrary vector which is not parallel with the x axial direction is determined, and the pattern elements are further arranged on a position which is transferred in parallel by integral multiple of the vector with respect to all the pattern elements arranged on the x axis so as to be arranged uniformly on a recording plane,

when a size of the vector "a" is designated by "a", an angle formed by the vector "a" and the x axis is designated by θ, and an interval of the pattern elements in the x axial direction is designated by b, one of combinations of arbitrary integral numbers (k, l) is determined, and α and β are obtained as follows:

$$\alpha = ka \cdot \cos\theta + lb$$

$$\beta = \sqrt{\{(ka)^2 + 2klab \cdot \cos\theta + (lb)^2\}},$$

when an y axial component of the vector (ka) is positive,

$$\varphi = \text{Arccos}\ (\alpha/\beta),$$

when the y axial component of the vector (ka) is negative,

$$\varphi = -\text{Arccos}\ (\alpha/\beta),$$

and the plane where the pattern elements are arranged is rotated through the angle $-\varphi$ in a state that a counterclockwise direction is the positive direction,

a portion for an arbitrary width determined with respect to the x axial direction is fetched from the plane where the pattern elements are arranged, so as to be a first burst area,

the first burst area is inverted axisymmetrically with respect to the x axis so as to be a second burst area,

the first and second burst areas are arranged so that their x axes match with the circumferential direction of the disc and their y axes match with the radial direction of the disc, and thus periodicity is provided to the circumferential direction.